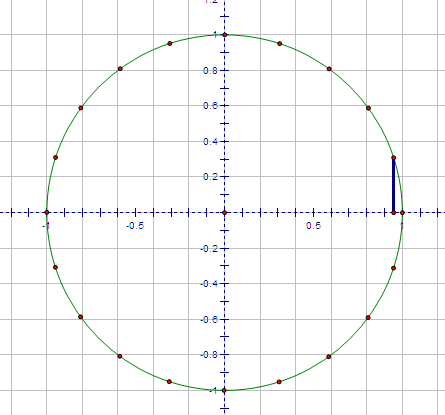
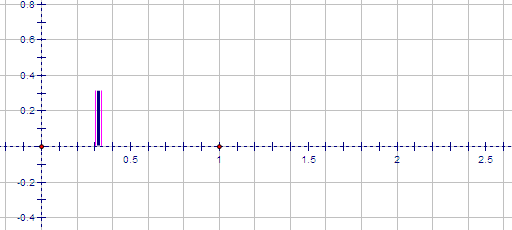
Spaghetti Sine

**Materials**

|  |  |
| --- | --- |
| -spaghetti | -tape |
| -1 piece of A3 Graph paper | -one Wiki Stick® |
| -1 unit circle partitioned off | |

**Instructions**

1. Place one end of the WIKI Stick ® at (1,0) on your unit circle. Use the WIKI Stick to measure the ARC LENGTH from (1,0) to the first marked point on the circle
2. Measure out that arc length on the x-axis of your graph paper. Make a tick mark on the x-axis to represent the arc length to the first point.
3. Break one piece of spaghetti so that it is the vertical distance from the “1st point” on your unit circle to the x-axis. (as seen in the picture below)
4. Vertically, place this piece of spaghetti at the tic mark (from step 2) on the x-axis. (Illustrated below). Tape it to the graph.



1. Move counter clockwise around the circle, and continue doing this for all the points on the circle.
2. After about 10 points, you may look for patterns and shortcuts to streamline the rest of the process.

**Reflection on this Exercise**

The tips of your pieces of spaghetti form a function.

**Consider** how you created this function:

Q1: What do the input-values represent in your function?

Q2: What do the output values represent in your function?

If you plot all possible (input, output) pairs in the same way you would have a smooth curve that represents the very important SINE Function:

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**Definition:**



Notice the input of the Sine Function is  which usually represents an angle. Go back and look at your answer to Q1. Did you say the input was an *angle*? You might have said it was an arc length. That would have also been correct. What is the connection between arc length and angle measurement in **radians?**

**REVISE** your answer to Q1 to show you understand this connection.

Q3: Looking at the graph, what is the range of the graph?

Q4: What do you think will occur to the graph if you kept moving around the circle?

Q5: What do you think will occur to the left of (0,0) on your graph?

Q6: Using Questions 2 and 3, what is the domain of this graph?